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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/534,459	05/11/2005	Hiroshi Kurakata	4918-0102PUS1	6940
2292 7590 06/15/2007 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			EXAMINER THOMPSON RUMMEL, PONDER N	
			ART UNIT 1709	PAPER NUMBER
			NOTIFICATION DATE 06/15/2007	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary

Application No.

10/534,459

Applicant(s)

KURAKATA, HIROSHI

Examiner

Ponder N. Thompson-Rummel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6, 8-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 10-15 is/are rejected.
- 7) ☒ Claim(s) 8 and 9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 5/11/2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION***Claim Objections***

1. Claims 8 and 9 are objected to under 37 CFR 1.75(c) as being in improper form because claim 8 and 9 are dependent upon canceled claim 7. See MPEP § 608.01(n). Accordingly, the claims have not been further treated on the merits.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

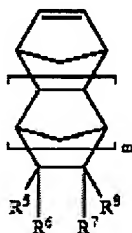
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 6, 10-12 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Jayaraman et al (US Patent 6,147,177).

With respect to claims 1-3, 6, 10-12 and 15 Jayaraman et al. discloses a photoresist composition that is soluble in aqueous base comprising:

- A. a polycyclic monomer having an acid labile group, such as a carboxyl group, represented by formula (II) (column 6, lines 35-45)

II

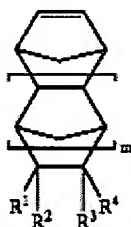


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where at least one R^5 to R^8 preferably represents $-(A)_nC(O)OR^*$, m is an integer from 0 to 5 (column 6, lines 55-57), n is an integer of 0 or 1, A represents a single covalent bond (when $n = 0$) or a divalent group (column 7, lines 1-3), R^* represents $-C(CH_3)_3$, $CH(R^p)OCH_2CH_3$, $-CH(R^p)OC(CH_3)_3$ or cyclic group wherein R^p represents a hydrogen or linear or branched alkyl group (column 8, line 6-30).

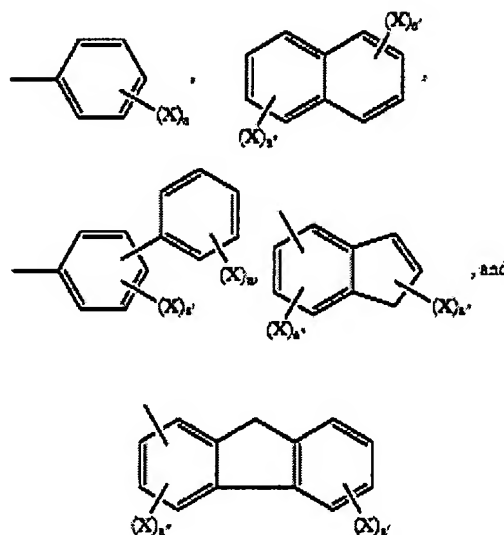
- B. an acid-generating agent (a photoacid generator - column 20, lines 44-52);
- C. a crosslinking agent such as methoxymethyl substituted melamine and cyclic urea compounds (column 20, lines 10-16);
- D. a solvent such as propylene glycol ethyl ether acetate, cyclohexanone, and ethyl lactate (column 21, lines 29-31).

With respect to claim 6, a monomer having a phenylamide group as represented by formula (I) can be also used in combination with the monomer of formula (II) (column 17, lines 18-22),



wherein at least one of R^1 to R^4 must be selected from an aromatic ring containing substituents: $-(CH_2)_nNHC(O)G$ and $-C(O)NH(CH_2)_nG$, G is an

aromatic group selected from the following moieties (column 3, lines 55-65 and column 4, lines 1-10)



wherein X represent OR¹⁴ or R¹⁵ (column 4, lines 11), a, a' and a'' represents the number of times substituent X is substituted on the ring system and a is an integer from 1 to 5, a' is an integer from 1 to 4 and a'' is an integer from 1 to 3 (column 4, lines 20-24), m is an integer from 0 –5, preferably 0 to 1 (column 3, line 50), n is an integer from 0 to 5 (column 3, lines 50-51), R¹⁴ is a hydrogen, linear or branched (C₁ to C₁₀) alkyl, –C(O)CH₃, tetrahydropyranyl, t-butyl and R¹⁵ is a hydrogen, cyano, halogen, and –C(O)O-t-butyl (column 4, lines 23-28).

The monomers are polymerized by ring-opening metathesis polymerization (ROMP) with subsequent hydrogenation (column 13, lines 10-14) in the presence of a catalyst that consist of a ruthenium metal carbene complex catalyst (lines 41-41-45).

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With respect to claims 10-12 and 15, Jayaraman et al. also discloses a method of forming an image by coating a substrate with film comprising the positive or negative photoresist of A-D (column 21, lines 26-33), imagewise exposing the film to radiation by electron beam xenon lamp, x-ray (ultraviolet) radiation (column 21, lines 37-45), and developing the pattern with an aqueous solution (for example, tetramethyl ammonium hydroxide) (column 21, lines 59-63).

Claim Rejections - 35 USC § 103

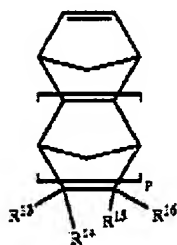
4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 4, 5, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jayaraman et al. as applied to claims 1-3, 6, 10-12 and 15 above, and further in view of Taguchi et al. (US 2004/0152843).

With respect to claims 4, 5, 13 and 14, Jayaraman et al. discloses the photoresist composition co claims 1 and 10. However, Jayaraman et al. fails to disclose the use of an organoruthenium compound in which a neutral electron donating ligand is a heterocyclic carbene compound with a nitrogen atom.

Taguchi et al. discloses a resin that comprises: a ring-opening copolymer that has an alicyclic monomer of formula (12) (paragraphs [0038] and [0039])



(12)

where at least one R^{13} to R^{16} is a substituent having a hydroxycarbonyl group (-COOH) (paragraph [0017]); an ionic curing agents (crosslinking agent) (paragraph [0107]); and a solvent (paragraph [0085]) wherein the monomer having the hydroxycarbonyl group is subjected to ring-opening metathesis copolymerization in the presence of a catalyst that consist of a organic ruthenium compound in which a neutral electron-donating ligand is coordinated (paragraph [0067]) and where such ligand is a heterocyclic carbene compound with a nitrogen atom such as 1,3-dimesitylimidazolin-2-ylidene and 1,3-dimesitylimidazolidin-2-ylidene (paragraph [0075]). The catalyst containing a metal such as ruthenium are preferred because side reactions causing modification of functional groups do not occur, and carbon-carbon unsaturated bonds of the copolymer can be selectively hydrogenated (paragraph [0092]). Also, the activity for copolymerization tends to be enhanced upon using the preferred carbene compounds (paragraph [0075]).

It would have been obvious to one of ordinary skill within the art at the time of the invention to use an organoruthenium catalyst such as dimesitylimidazolin-2-ylidene and 1,3-dimesitylimidazolidin-2-ylidene as taught by Taguchi et al. within the photoresist of Jayaraman et al. to prevent modification of

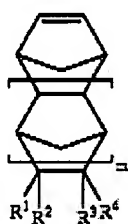
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functional group by preventing side reactions within the copolymer, selectively hydrogenate unsaturated carbon-carbon bonds, and to enhance copolymerization.

6. Claims 1-3, 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodall et al (US 2002/0128408) in view of Taguchi et al.(US 2004/0152843).

With respect to claims 1-3 and 10-12, Goodall et al. discloses a radiation sensitive photoresist composition that is soluble in an aqueous solution (alkali – abstract) comprising:

A. an acid-labile monomer represented by formula (I) (paragraph [0031])



where R1 to R4 represents (paragraph [0032]) which can be polymerized by ring opening polymerization with subsequent hydrogenation (paragraph [0092]) in the presence of a catalyst, such as ruthenium (paragraph [0095]), in a solvent;

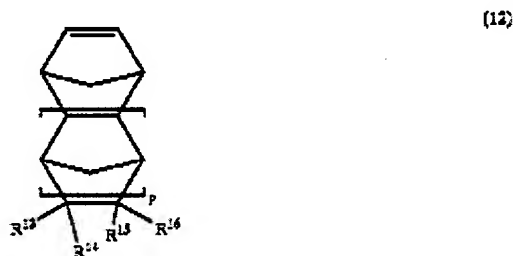
B. a photoacid initiator (acid-generating agent) such as and;

C. a solvent such as benzene and toluene (paragraph [0108] and [0199]).

Goodall also discloses a method of forming an image by coating a substrate with film comprising the positive photoresist of A-C (paragraph [0219]), imagewise

exposing the film to radiation by electron beam or electromagnetic radiation (UV) (paragraph [0220]), and developing the pattern with an aqueous solution (for example, TMAH) (paragraph [0021]). However, Goodall et al. fails to disclose the use of a crosslinking agent within the photoresist composition.

Taguchi et al. discloses a resin that comprises a ring-opening copolymer that has a alicyclic monomer of formula (12) (paragraphs [0038] and [0039])



with a hydroxyl group or hydroxycarbonyl group and a curing agent (crosslinker) such as hexamethylenediamine (paragraph [0107]). The curing agents are used to provide excellent fire retardancy (paragraph [0110]).

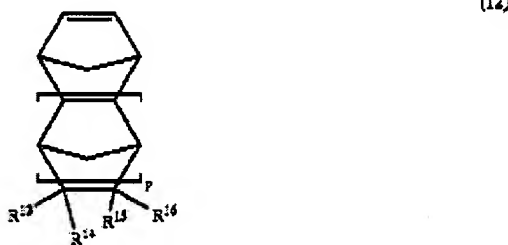
It would have been obvious to one of ordinary skill within the art to include the use of a curing agent (crosslinking agent) as disclosed within Taguchi et al within the photoresist of Goodall et al. to improve fire retardancy.

7. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi et al (US 2004/0152843) in view of Suwa et al (US Patent 6,727,032).

With respect to claim 1, Taguchi et al. discloses a resin containing a ring- opened methathesis copolymer that comprises:

A. an alicyclic monomer of formula (12) (paragraphs [0038] and [0039])

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where at least one R^{13} to R^{16} is a substituent having a hydroxycarbonyl group (-COOH) and the remainder of R^{13} to R^{16} is hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a halogen atom, silicon atom, oxygen atom or nitrogen atom other than a hydroxycarbonyl group and where p is an integer of 0-2 (paragraph [0017]). Examples of the monomer of formula (9) having a hydroxylcarbonyl group (acidic carboxyl group -COOH) include 5-hydroxycarbonylbicyclo-[2.2.1]hept-2-ene, 5,6-dihydroxycarbonylbicyclo[2.2.1]hept-2-ene, 5-methyl-5-hydroxycarbonylbicyclo[2.2.1]hept-2-ene, 8-hydroxycarbonyltetracyclo[4.4.0^{2,5}.1^{7,10}]dodec-3-ene and 8-methyl-8-hydroxycarbonyltetracyclo[4.4.01^{2,5}.1^{7,10}]dodec-3-ene, and 8-methyl-8,9-dihydroxycarbonyltetracyclo-[4.4.0.1^{2,5}.1^{7,10}]dodec-3-ene (paragraph [0057]);

- B. an ionic curing agent (crosslinking agent) such as hexamethylenediamine, diisocyanate compounds, and polyamine compounds (paragraph [0107]);
- C. a solvent (paragraph [0085]) such as cyclopentane, cyclohexane, methylcyclohexane, benzene, toluene, acetonitrile and diethyl ether, in

which the solvent used for copolymerization is capable of dissolving the copolymer (paragraph [0085], lines 7 and 8).

The monomer having the hydroxycarbonyl group is subjected to ring-opening metathesis copolymerization in the presence of a catalyst that consist of a organic ruthenium compound in which a neutral electron-donating ligand is coordinated (paragraph [0067]) and such ligand is a heterocyclic carbene compound with a nitrogen atom such as 1,3-dimesitylimidazolin-2-ylidene and 1,3-dimesitylimidazolidin-2-ylidene (paragraph [0075]).

However, Taguchi et al fails to disclose the use of an acid-generating agent within the final resin that comprises the copolymer consisting (A) – (C).

Suwa et al. discloses a radiation sensitive composition which is slightly soluble in alkali (column 3, lines 23-24) that comprises an alicyclic skeleton and an acid-generating agent such as diazobenzoquinone compounds and diazonaphthoquinone compounds (column 19, lines 66-67), which has the function of cleaving an acid-cleavable group present in the resin or an acid generated by exposure to irradiation (column 19, lines 14-17). If the amount of acid generating agent is too small, then sensitivity and developability may be lowered (column 19, lines 44-46). If the amount of acid generating agent is too much, then transparency for radiation is lowered and as a result, may show a tendency to obtain a rectangular photoresist pattern (column 10, lines 45-49).

It would have been obvious to one of ordinary skill in the art at the time of the invention to include an acid-generating agent as described by Suwa et al.

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within the resin of Taguchi et al. to increase sensitivity and developability as well as enhance transparency and prevent unwanted patterning.


Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ponder N. Thompson-Rummel whose telephone number is 571-272-9816. The examiner can normally be reached on Monday-Friday 7:30 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ptr
P.T.A.


BARBARA GILLIAM
PRIMARY EXAMINER

